



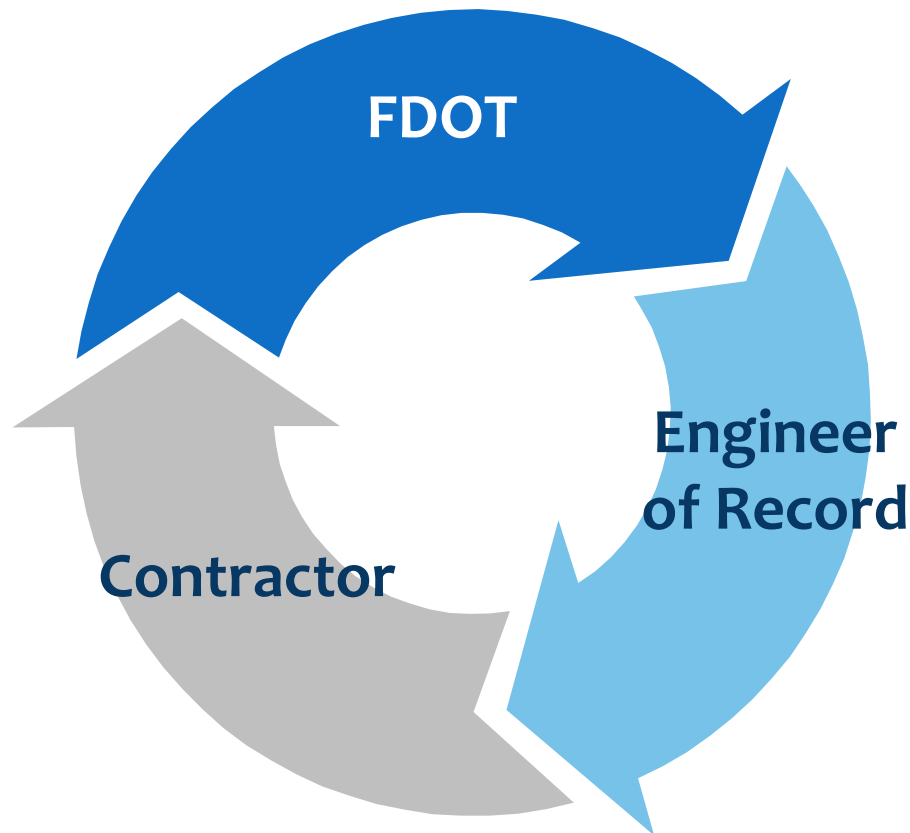
How 3D Modeling Benefits our Industry – “Transportation/Highway Engineering” in Planning, Design and Construction

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3D Modeling Benefits

- Every member of the team benefits



3D Modeling Benefits

Florida Department of Transportation

- Lower Construction Costs
- Lower Consultant Costs
- Multiple preliminary models can be done in the PD&E stage and used in the design phase as well
- Homogenous flow of 3D project data, from survey to design to construction



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3D Modeling Benefits

Engineer of Record

- See potential issues in design that would have been impossible to catch prior to construction
- Intelligent Design - If a change is made to the 2D plan or profile, all parts of the model are updated
- Less time spent fixing drainage and utility conflicts during construction
- More complete design developed, verses old cross section designs
- Export to 3D PDF and use models for Public Meetings

3D Modeling Benefits

Contractor

- A model utilized in tandem with the latest automated machine controlled equipment
- The model can be into software used to calculate cut/fill quantities more accurately
- Fewer issues during construction because every inch of the corridor can be designed
- Grading can be done much faster
- No survey staking required on project
- EOR's design is complete, no field "Request for Information" needed

3D Modeling Benefits

- Result in a savings of schedule time and construction costs



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3D Modeling Workflow

1. EOR story boards/plans the project design/engineering of the model.
2. EOR creates the 3D models segments using collaborative design/engineering using FDOTSS4 OpenRoads.
3. EOR isolates the finish grade surface and cuts cross sections for QC checking the model verses spreadsheet calculations at a specified interval (i.e 50 feet)
4. EOR exports the finish grade surface to XML format for delivery to the contractor
5. Contractor imports finish grade XML file to the AMG Construction Equipment for preliminary grading, final grading, concrete paving, etc.

Project Example – SR 9B

We are working with FDOT Awarded Design/Build Construction Contractor, Superior Construction for this project south of Jacksonville. Phase 2 is almost complete and Phase 3 is underway. We have been delivering models as .XML files to Superior for this phase. They are currently grading the road using those files and automated machine guidance.



Project Example – SR 9B

Where the two phases meet, we exported the model to Google Earth. This is a great tool for public meetings and to quickly show the limits of construction on an aerial view.



Project Example – SR 9B

Corridors and Project Setup

- Utilizing many corridors allows many people to be able to work on the model at the same time
- This section was modeled with seven separate corridors linked to each other
- Point controls attach a point on one corridor to a point on an adjacent one. For example: The edge of unpaved shoulder on the inside of the ramp is attached to the corridor of the ditch between the ramp and the mainline



Project Example – SR 9B

Checking the Model

Superior Construction created a spreadsheet they formerly used to build the 3D model from the 2D plans. We used the same format to compare the plans to the model to check the models before sending the surfaces to them for construction.

SR 9B Right - Russel Sampson to Station 441+25

Lane 1 EOP Left				PGL				Station	Lane 1 EOP Right				Lane 2 EOP Right			
Calculated from Plans	Arcadis Model	O/S	Difference	Calculated from Plans	Arcadis Model	O/S	Difference		Calculated from Plans	Arcadis Model	O/S	Difference	Calculated from Plans	Arcadis Model	O/S	Difference
43.29	43.29	-19.59'	0.00	42.49	42.49	0.00'	0.00	1434+40	41.51	41.51	24.00'	0.00	41.03	41.03	35.58'	0.00
43.09	43.09	-18.00'	0.00	42.41	42.41	0.00'	0.00	1434+60	41.50	41.50	24.00'	0.00	41.12	41.12	34.00'	0.00
43.02	43.02	-18.00'	0.00	42.37	42.37	0.00'	0.00	1434+69.40	41.49	41.49	24.00'	0.00	41.12	41.12	34.00'	0.00
42.73	42.73	-12.00'	0.00	42.31	42.31	0.00'	0.00	1434+80	41.48	41.48	24.00'	0.00	41.41	41.41	26.00'	0.00
42.58	42.58	-12.00'	0.00	42.20	42.20	0.00'	0.00	1435+00	41.44	41.44	24.00'	0.00	41.37	41.37	26.00'	0.00
42.42	42.42	-12.00'	0.01	42.08	42.07	0.00'	0.01	1435+20	41.38	41.38	24.00'	-0.01	41.33	41.32	26.00'	0.01
42.24	42.24	-12.00'	0.00	41.94	41.93	0.00'	0.00	1435+40	41.32	41.31	24.00'	0.00	41.27	41.26	26.00'	0.00
42.05	42.05	-12.00'	0.00	41.78	41.78	0.00'	0.00	1435+60	41.23	41.23	24.00'	0.00	41.19	41.19	26.00'	0.00
41.96	41.96	-12.00'	0.00	41.70	41.70	0.00'	0.00	1435+69.40	41.19	41.19	24.00'	0.00	41.15	41.15	26.00'	0.00
41.87	41.87	-12.00'	0.00	41.63	41.63	0.00'	0.00	1435+77.79	41.15	41.15	24.00'	0.00	41.11	41.10	26.00'	0.00

FDOT Site Visit to the SR 9B Site



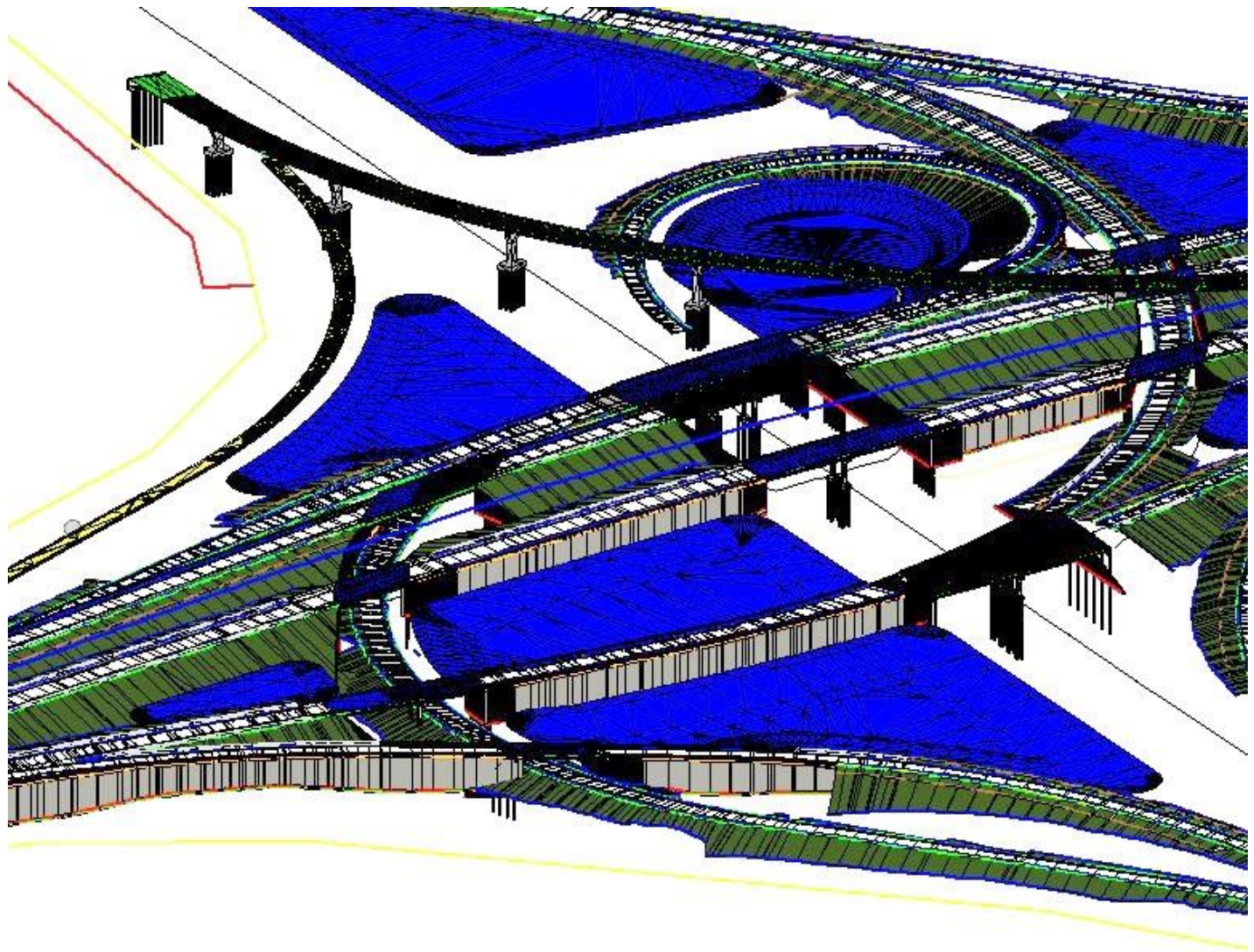


How Do We Get There?

- Continue working with contractors and the FDOT to provide the model in a useful format
- It is an iterative process
 - We continue to learn more about the OpenRoads technology and exactly how the contractor uses the 3D surfaces
 - We update the deliverables
- Collaboration between all three members of the team to continue to improve the processes for other firms/teams in the future

All in for 3D Delivery! ...

Owner, Surveyor, EOR, Contractor!



Questions/Discussion

